# Clinical and academic use of electronic and print books: the Health Sciences Library System e-book study at the University of Pittsburgh

**Barbara L. Folb, MM, MLS, MPH; Charles B. Wessel, MLS; Leslie J. Czechowski, MA, MLS**

See end of article for authors' affiliations.

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**Objectives:** The purpose of the Health Sciences Library System (HSLS) electronic book (e-book) study was to assess use, and factors affecting use, of e-books by all patron groups of an academic health sciences library serving both university and health system–affiliated patrons.

**Methods:** A web-based survey was distributed to a random sample (n=5,292) of holders of library remote access passwords. A total of 871 completed and 108 partially completed surveys were received, for an approximate response rate of 16.5%–18.5%, with all user groups represented. Descriptive and chi-square analysis was done using SPSS 17.

**Results:** Library e-books were used by 55.4% of respondents. Use by role varied: 21.3% of faculty reported having assigned all or part of an e-book for class readings, while 86% of interns, residents, and fellows reported using an e-book to support clinical care. Respondents preferred print for textbooks and manuals and electronic format for research protocols, pharmaceutical, and reference books, but indicated high flexibility about format choice. They rated printing and saving e-book content as more important than annotation, highlighting, and bookmarking features.

**Conclusions:** Respondents' willingness to use alternate formats, if convenient, suggests that libraries can selectively reduce title duplication between print and e-books and still support library user information needs, especially if publishers provide features that users want. Marketing and user education may increase use of e-book collections.

## INTRODUCTION

For more than a decade, health sciences libraries have been building and providing digital electronic collections of journals and books [1, 2]. Most print journals have been replaced with electronic journals (e-journals) and readily embraced by users [3, 4]. Academic health sciences libraries continue to expand electronic book (e-book) availability and invest in improving e-book access [5–7], as external book circulation continues to decrease [8]. Book publishers and users are adapting to the e-book format as librarians attempt to determine which book formats, print or electronic, make the most sense for their collections, budgets, and most importantly, their users [9–12].

The scenario, described above, was the impetus for a study by the Health Sciences Library System (HSLS) at the University of Pittsburgh (Pitt) of how geographically distributed and diverse patrons use e-books. HSLS wanted to know if duplication of titles in print and e-book format could be reduced, while still meeting users' information needs. HSLS serves Pitt's six schools of the health sciences <http://www.health.pitt.edu> (medicine, dental medicine, nursing, pharmacy, public health, and rehabilitation) and the hospitals and programs of the UPMC health system <http://www.upmc.com>. HSLS provides access to licensed electronic resources for all of UPMC in the United States and abroad. At the time of the study, HSLS consisted of three libraries: Falk Library, serving the six schools of

A supplemental appendix, Table 1, and Table 2 are available with the online version of this journal.

### Highlights

- Health sciences library users are flexible and will use either electronic or print books depending on what is most convenient or available at time of need.
- Users in information-intensive roles—whether clinical, research, or study oriented—are the heaviest users of both e-books and print books.
- Use of the physical and virtual library is correlated: The heaviest users use both.
- In spite of little promotion beyond prominent placement on the library home page, 65.5% of respondents were aware of the e-book collection.
- Users preferred federated full-text search options to searching the library catalog.

### Implications

- While users have preferences for different formats, they may accept selective reduction in duplication between e-book and print collections.
- Cataloging librarians need to optimize the structure of e-book cataloging records to maximize ease of use and consider repackaging cataloging records for access through web interfaces that library users prefer.
- Librarians can increase awareness of their e-book collections by engaging in active promotion, instructional activities, and development of e-book discovery tools that users will adopt.

the health sciences and the UPMC hospitals contiguous to Pitt's main campus; the professional and consumer health libraries at UPMC Shadyside <http://www.upmc.com/HospitalsFacilities/Hospitals/Shadyside/>; and the libraries of Children's Hospital of Pittsburgh of UPMC <http://www.chp.edu>.

HSLS has been collecting e-books for over 10 years and at the time of this study licensed over 2,000 e-books from vendors such as Ovid, MD Consult, STAT!Ref, McGraw-Hill, and Rittenhouse. All HSLS e-books had MARC records in the online library catalog and were included in a browsable list on the libraries' website. A federated clustering search tool developed by the HSLS provided direct access to many of the e-books from the libraries' home page <http://www.hsls.pitt.edu> [6]. Additionally, university faculty, staff, and students could access Pitt University Library System e-books from providers such as ebrary, netLibrary, Springer, and Knovel. At the time of the study, handheld e-book readers such as the Amazon Kindle were rising in popularity for leisure reading purposes. Because academic application of these readers was in its infancy, they were not supported by HSLS [13–15].

## LITERATURE REVIEW

### Focus of existing e-book literature

Articles on e-books in academic libraries began appearing soon after vendors began offering them in the late 1990s [16]. The literature on e-books in libraries has covered a handful of core issues from the beginning, but the discussion has changed as e-book features, cataloging practice, and user awareness and adoption of e-books has evolved. Issues addressed include identification of e-book users by demographic groups, cataloging practice, and e-book access provision [6, 17–21]; meaningful comparison of statistics on use of print and e-books [9, 22–24]; variability in statistics provided by e-book vendors [25]; activities supported by e-book use [26–30]; use by type of book [31]; user characteristics affecting e-book use [28, 32–34]; and features desired in e-books [5, 16, 27, 30–32, 35, 36].

E-book surveys of academic populations in the United States and the United Kingdom have included multi-university surveys of people in all roles [32] and surveys of all roles at a single university [18, 30, 31, 37], students at a single university [38], students at multiple universities [35], and faculty at multiple universities [27]. E-book studies in academic health sciences environments included a statistical comparison of print book circulation to e-book access [9], a study of how many titles from the Brandon/Hill list were available as e-books in 2004 [7], a survey of medical students in clinical rotations [26], surveys of dental and nursing students using digital textbooks [29, 39], focus groups with midwifery students in the United Kingdom [40], and an observation and interview study including five undergraduate nursing students in the population [41]. No surveys were found that studied all user groups in an academic health sciences library.

### Factors associated with differences in e-book use

When comparing use of print and e-book versions of the same title, studies indicate that e-books are accessed more frequently than print books are checked out [9], but it is difficult to make meaningful comparisons because usage statistics measure different types of access [9, 22–24]. Differences in e-book use by academic discipline [33] or role [30] have been noted but not explored in depth. Studies have not reported significant differences in use between faculty and students. For example, Levine-Clark reported use between 51% and 54% for both groups [33]. There are some modest differences in e-book use between men and women. A UK study found men (65.4%) more likely than women (63.6%) to use e-books, and men were also more likely than women to read a whole chapter on screen [32]. No studies of e-books in hospitals were located that surveyed and compared all hospital employee groups.

### Barriers and facilitators to e-book use

Low awareness of the collections could be a barrier to use. Existing studies reported that 43%–67% of library patrons were aware of library e-book collections [30, 33, 35, 38]. Use of e-books was slightly lower than awareness, varying between 40% and 62% [32, 33, 35, 38, 42].

High e-book visibility and ease of access should increase use. Discovery of e-books occurs through library websites, catalogs, and library staff [5, 27, 32, 33, 35, 42]. Adding MARC records to the catalog [5, 17, 30] and e-book federated search tools on a website [30] increases use of library e-books. A study assessing e-book accessibility on Association of Research Libraries websites reported that library catalogs usually provided cumbersome, multistep methods to limit a search to e-books. The researchers concluded that catalogs should be modified to provide a single-step e-book limit, and alternative access points to e-books on library websites were needed [19].

Librarians may purchase e-books with distant users in mind, and a study of e-book use by on and off campus students did report that off campus use was disproportionately high [28]. However, a study at Texas A&M University reported that use of e-books by distance students was much lower than their use of e-journals and databases [43]. E-books, just like e-journals, are used by people on campus who can visit the library. One study showed that most researchers used e-books from nonlibrary locations on campus [34]. The convenience of using e-books is appreciated by users both on and off campus.

One frequently discussed barrier to e-book use is the discomfort of screen reading. Because academic users commonly use e-books for ready reference, screen reading may be less of a barrier to adoption than it initially appears. Users prefer to read short sections of books online but prefer print for reading an entire book [30, 32]. A UK study reported that 62.6% of students and 57.8% of faculty read entirely

on screen the last time they used an e-book; only 6.4% and 6.5%, respectively, printed materials to read [32].

Users expect e-books to include the features and functionality that they enjoy in print, enhanced with online features. Features and attributes desired by academic users included keyword searching, 24/7 accessibility, simultaneous users, downloading, copying and pasting, and printing [30, 42, 44]. Products such as SpringerLink—which have ''journalized'' e-books, allowing printing and saving of entire chapters and inexpensive print on demand of entire e-books—may make e-books a more well-rounded product [5]. In the 2007 ebrary faculty survey, over half of respondents said the ability to download and fewer restrictions on printing and copying would make e-books more suitable for use [27]. Highlighting and annotation of e-books was desired by 94.9% of students in one survey [36], but ranked lower than searching, access, downloading, and printing features to students in another survey [35].

### Type of book and format preference

No matter if a book is published as a textbook, reference source, or other book type, most readers report using e-books like reference books. They search for specific information and read short sections of needed information across all types of books [32, 33, 39]. Some studies reported e-book use by type. Faculty and students at one UK university reported using e-books as textbooks (59.9%), reference books (52.4%), and research monographs (46%) [42]. No studies were found reporting use of e-books in health sciences settings by type of book.

### Intended use and e-book or print preference

In academia, library e-books are used more for research and individual study than assigned class readings [30]. The ebrary faculty survey found more faculty assigned e-journal readings (57%) than assigned e-book readings (29%) [27]. Research looking at e-textbooks as replacements for student purchase of required class texts reported that integrating e-books into the virtual learning environment was challenging [29], and student success in using them depended on good user education [45].

In the clinical environment, the University of Iowa compared medical student use of print medical books and 3 online resources (UpToDate, MD Consult, and Harrison's Online) to support patient care and learning during clinical rotations. Engaged in intensive learning, students often consulted major medical publications daily in their preferred format. They preferred UpToDate (53%) and MD Consult (33%) by a wide margin over print (14%) [26]. The authors concluded that accessibility was not the main factor driving their preference, because both print and e-books were accessible in the hospital wards. Their survey suggested that student choices are driven by their perception of how quickly they can find an answer.

After reviewing the literature, it was not clear how to apply the findings of these studies to the HSLS user population, as most previous studies did not address health sciences library users. HSLS also had additional questions concerning the use made of e-books and print books in the collection and what features of e-books users specifically wanted and preferred. To work toward an ideal collection that would meet the needs of all users, HSLS developed a survey of its user population.

## METHODS

### Survey development for the Health Sciences Library System (HSLS) e-book study

A probability sample survey was developed for online administration. Some questions applicable to any library setting were adapted from existing e-book surveys, [32, 33, 35], while other questions specific to health sciences libraries were created for this survey.

The purpose of the HSLS e-book study was to ascertain: (1) what factors and demographic profiles were associated with the differences in print and e-book use, (2) what barriers and facilitators to e-book use did HSLS patrons experience, (3) whether there was an association between the type of book (i.e., manual, textbook, handbook) and format preference (electronic or print), and (4) whether there was an association between selecting a print versus an e-book and the patron's intended use (i.e., classroom teaching, clinical, study, research)? Within these four main questions, HSLS identified important sub-questions to address in the survey:

1. What factors and demographic profiles are associated with differences in print and e-book use?
   - Are organizational affiliations, roles, or other demographic factors associated with variations in e-book use?
2. What barriers and facilitators to e-book use do HSLS patrons experience?
   - Are HSLS users aware of the e-book collection?
   - What are user opinions of the e-book discovery and searching tools?
   - Does use of the physical library and HSLS website vary with distance from a library or perception of available time?
   - How much do HSLS users value e-book features, including full-text searching, saving and printing options, and highlighting and annotation?
3. Is there an association between the type of book and e-book or print preference?
   - If replacing print books with e-books, what types of print books would be more acceptable as e-books?
   - How flexible are HSLS users about choice of print versus e-book?
4. Is there an association between the selection of a print or e-book and the patron's intended use?
   - Is the e-book collection supporting all academic and clinical tasks?

Two versions of the survey (Appendix, online only), one for UPMC with 46 questions and one for

University of Pittsburgh with 47 questions, were created to reduce the burden on respondents of non-applicable questions. To reduce confusion, e-book was defined in the survey introduction, and examples of each type of book (reference, textbook, etc.) were given in the appropriate questions. Questions that identified respondents with multiple affiliations and roles, such as a UPMC clinical physician with a faculty appointment at the university were included in both versions. Surveys were entered into Opinio survey software, version 4.3.4; tested by HSLS librarians and graduate students in a survey methods class; and edited based on their feedback. The study received University of Pittsburgh Internal Review Board approval as an exempt study.

### Sampling and survey distribution

The target population was all HSLS library users. This community encompasses faculty, researchers, clinicians, residents, fellows, employees, and students practicing and learning in the schools of the health sciences and across UPMC. The email addresses of all patrons registered for an HSLS remote access password as of March 5, 2009, with librarians removed, served as the sampling frame. In total, there were 5,222 UPMC and 4,250 university email addresses. Sample sizes were calculated assuming 50% of respondents used e-books, adjusted for population size, and an estimated 25% response rate [46], giving samples of 2,608 for the university and 2,684 for UPMC. Random samples were drawn from each list using SPSS 17.0. Email invitations were sent out in March 2009, followed by 3 reminders at 5-day intervals. Data collection continued for 22 days.

### Analysis

The data from both surveys were exported from Opinio into SPSS 17.0 and merged into one file for analysis. Open-ended responses were analyzed and recoded into discrete categories. For example, all nursing specialties respondents who chose to enter under ''Other'' were recoded as ''Nurse.'' Some response categories, such as the Pitt roles ''Staff'' and ''Research assistant,'' were combined into one category to yield logical categories of sufficient size for statistical analysis. Basic descriptive statistics and cross-tabulations were run.

## RESULTS

### Response rate

Response rates were: Pitt, 434 complete, 42 partial responses, total university response, 476; UPMC, 437 complete, 66 partial responses, total UPMC response, 503; and overall response, 871 complete, 108 partial responses, for a total of 979. Missing data from partial responses were handled with pairwise deletion, allowing the use of data from incomplete surveys in the analysis. American Association for Public Opinion Research (AAPOR) methods of response rate (RR) calculation RR5 and RR6 were used to calculate response rates [47], which can only be approximated for this type of email survey [48]. The combined response rate estimate is between 16.5% and 18.5% (university, 16.6%–18.3%; UPMC, 16.3%–18.7%). Response rates to Internet surveys vary widely, as shown by a meta-analysis of Internet survey response rates that reported rates between 7% and 88% with a mean of 34% [49].

### Profile of respondents

Table 1 (online only) presents demographic data on the respondents. The mean age was 39.9 (standard deviation, 13; range, 19–85). The university sample was skewed toward younger ages, reflecting the student population. The UPMC sample had a normal distribution curve within a typical working age range. A higher proportion of women than men responded to both surveys. Pitt statistics on enrollment of graduate and professional students by gender as of October 2008 and for faculty by gender in 2007 [50], the most recent located at the time of analysis, were compared to survey respondent data. Female students were overrepresented by 12.6% and female faculty members by 6.3%. A profile of the UPMC workforce as a whole was not readily available. Respondents' confidence in their computer skills was high (Table 1, online only).

All user groups were represented in the pool. More than half of respondents with UPMC email addresses (n=261/481, 54%) indicated that they had roles at the university as well as UPMC and were counted in both categories in Table 2 (online only). The large proportion of graduate and professional students (32%) compared to undergraduate students (7%) reflected the student mix of the health sciences schools (Table 2, online only).

### Factors associated with differences in e-book use

**Demographics and use of e-books and print books.** Overall, 55.4% (n=505/911) of respondents reported using an HSLS e-book. Cross-tabulation with Pearson chi-square showed use of e-books from HSLS was not related to UPMC or university affiliation or to age of respondent, but role at their primary institution was related to use of e-books (Table 3). Over 70% of UPMC respondents in the categories of ''attending physicians''; ''interns, residents, or fellow''; and Pitt ''postdoctoral or fellows'' reported using e-books. Use of e-books by UPMC respondents in other roles ranged from 28.6% for administrators to 56.8% for researchers. At Pitt, respondents in other roles ranged from 48.9% of undergraduates to 64.7% of faculty. Gender was associated with use of e-books. Men (n=202/303, 66.7%) were more likely than women (n=279/508, 54.9%) to report using HSLS e-books ($\chi^2=10.849$, $df=1$, $P<0.001$), a statistically significant difference. In addition, there was a significant difference between the sexes in the use of e-books

**Table 3**
Reported e-book use by role at University of Pittsburgh Medical Center (UPMC) or University of Pittsburgh

| Affiliation and role* | Reported use of e-books | |
|---|---|---|
| | n | (%) |
| UPMC (n=435)† | | |
| Intern, resident, or fellow (n=91) | 73 | (80.2%) |
| Attending physician (n=71) | 52 | (73.2%) |
| Researcher (n=74) | 42 | (56.8%) |
| Other (n=25) | 14 | (56.0%) |
| Other patient care (n=35) | 19 | (54.3%) |
| Support staff (n=43) | 18 | (41.9%) |
| Nurse (n=68) | 28 | (41.2%) |
| Administrator (n=28) | 8 | (28.6%) |
| University of Pittsburgh (n=648)‡ | | |
| Postdoctoral or fellow (n=74) | 54 | (73.0%) |
| Faculty or teaching role (n=215) | 139 | (64.7%) |
| Graduate or medical student (n=205) | 127 | (62.0%) |
| Staff (n=84) | 43 | (51.2%) |
| Undergraduate (n=45) | 22 | (48.9%) |
| Other (n=25) | 12 | (48.0%) |

* Respondents can appear in more than one category. Respondents with UPMC email addresses indicating roles at the university are included in both categories.
† $\chi^2$=48.051, *df*=7, *P*=0.000.
‡ $\chi^2$=13.705, *df*=5, *P*=0.018

for in-depth study. Men (n=167/313, 53.4%) were more likely than women (n=203/551, 36.8%) to report using HSLS e-books for in-depth reading ($\chi^2$=22.284, *df*=2, *P*=0.000).

### Barriers and facilitators to e-book use

**Respondent awareness and use of the e-book collection.** Most respondents (n=599/914, 65.5%) recalled seeing information about e-books on the HSLS website, although slightly fewer (n=505/911, 55.4%) reported using an HSLS e-book. Use of e-books to look up brief factual information was reported by 56.6% (n=516/911), while use for in-depth study was reported by 41.9% (n=383/913).

**Use and rating of e-book search tools.** The utility of the 5 HSLS e-book search tools, Google Books, and the Amazon Search Within the Book feature was rated by 863 respondents, as summarized in Figure 1. The federated full-text search tool was used by the largest percent of respondents (n=580/863, 67.2%) and was rated moderately to extremely useful by 74.3% (n=431/580) who used it. Google Books was also rated as moderately to extremely useful by 74.3% (n=373/502) who used it. They gave the lowest ratings to the library catalog (PITTCat), with 61.2% (n=306/500) rating it moderately to extremely useful.

**Respondent use of physical and virtual libraries.** Respondents reported using the HSLS website more than they used physical libraries to answer health sciences–related questions, but 66.9% (n=617/922) indicated they used both. The HSLS website was used

**Figure 1**
Utility of e-book search tools (n=863)

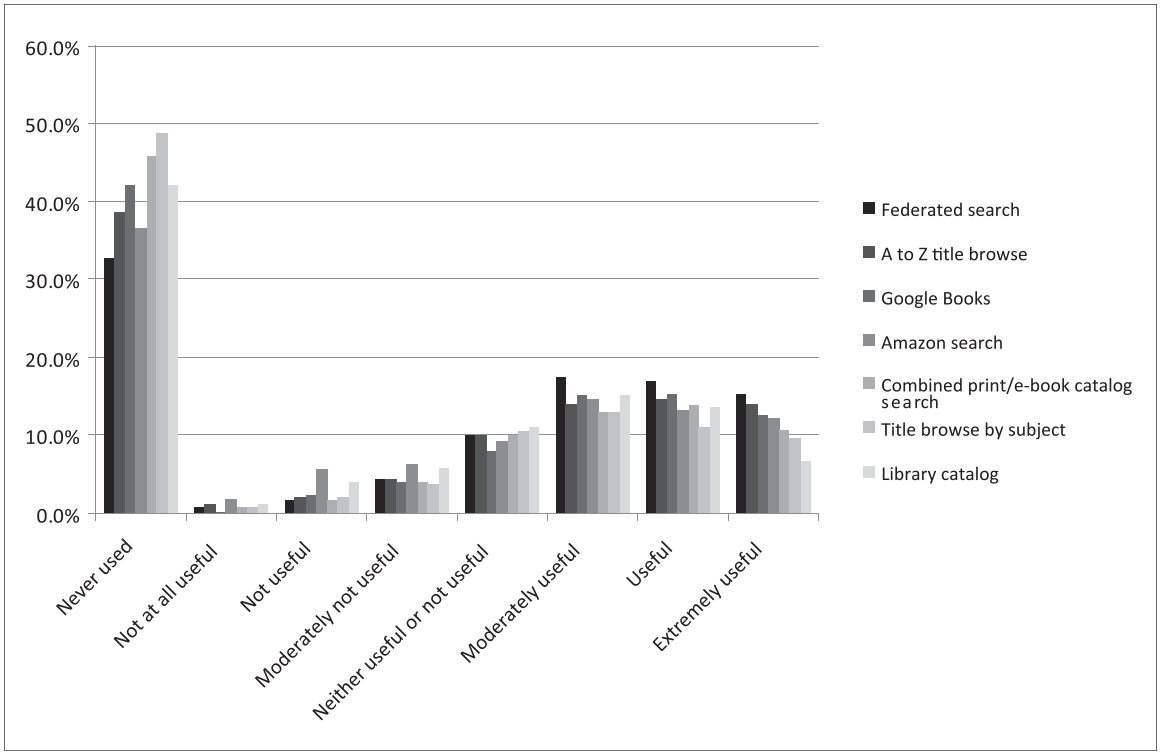
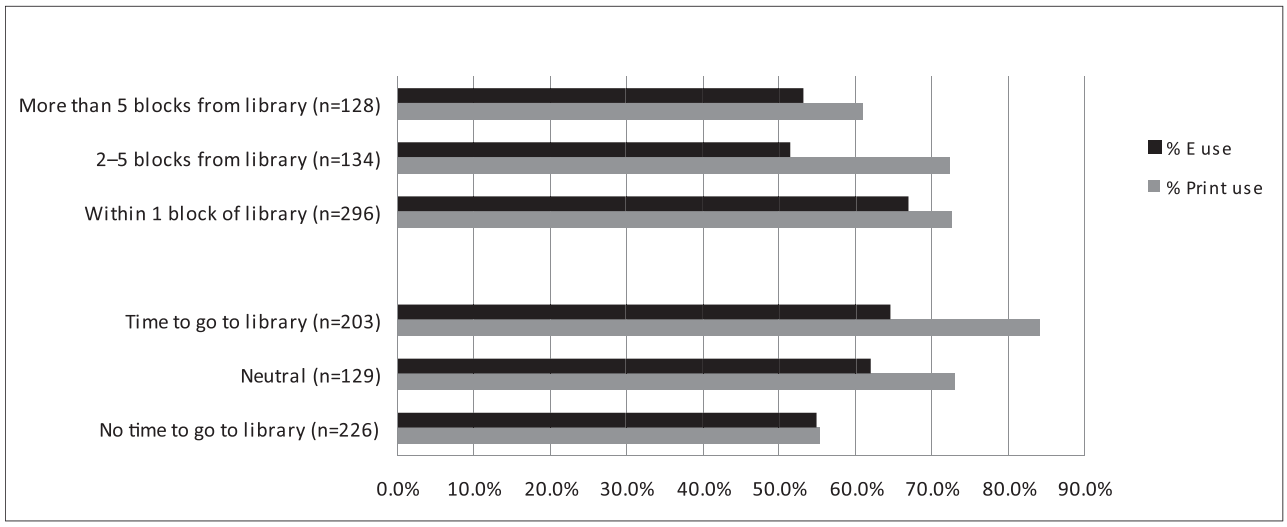


**Figure 2**
Percent using e-books and print within distance, time categories (n=558*)




* Includes only respondents who answered all questions.

by 95.4% (n=883/926) in the previous month, while walk-in use of the physical library in the past month was reported by 63.8% (n=406/636). A library was the primary work or study reading place for 5.4% (n=50/925) of respondents, while 45.1% (n=417/925) read at work and 45.6% (n=422/925) read at home.

Of those who used a library, 67.2% (n=432/643) borrowed or used an HSLS print book in the past year. Use of print and e-books was positively related ($\chi^2$=19.365, *df*=1, *P*=0.000). The proportion using both was 44.7% (n=262/586), while the proportion using neither was 17.1% (n=100/586). Print-only use was reported by 23.4% (n=137/586), and 14.8% (n=87/586) used only e-books. Respondents reported more confidence in their ability to find the print books in their library collection than the e-books. For e-books, 46.4% (n=417/899) agreed or completely agreed that they could locate them, while 66.7% (n=610/914) expressed the same degree of confidence for locating print books. When asked if e-books were accessible where they needed to use them, 45.3% (n=406/897) agreed, and about the same proportion agreed that the print collection contained books they needed (n=412/913, 45.1%). However, only 27.9% (n=255/914) agreed or completely agreed that they had time to get a print book when they needed it.

**Distance, time, and use of e-books and print books.** Correlations were examined between distance from the library, perceived available time to get books, and use of print and electronic books (Figure 2). For those who used a physical library, the closer they worked to the library, the more likely they were to have entered the library in the past month, but distance had no significant effect on use of print library books. In all distance categories, from ''in same building'' (n=110/154, 71.4%) to ''farther than 5 blocks away'' (n=78/128, 60.9%), the majority reported using an HSLS print book in the past year ($\chi^2$=6.555, *df*=3, *P*=0.088).

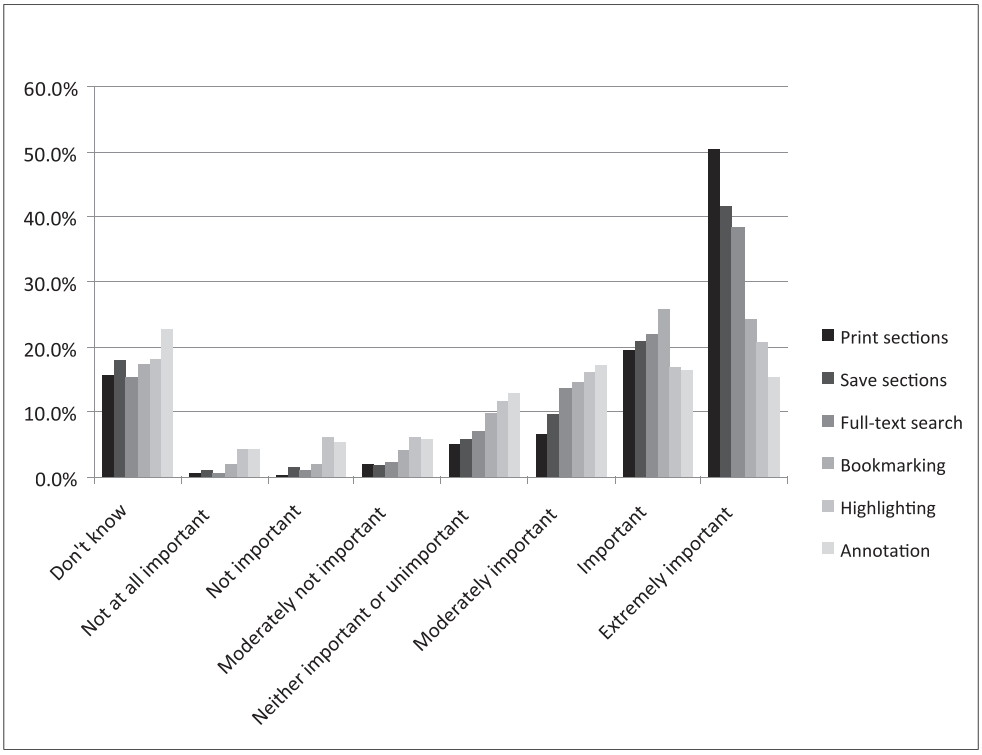
The perception of lack of time to go to the library to get a book was more influential than distance on print book use. Of the respondents who agreed or completely agreed that they had time to go to the library to get a book, 84.3% (n=172/204) had used an HSLS print book in the past year, while 55.3% (n=126/228) who disagreed or completely disagreed with the statement had used an HSLS print book ($\chi^2$=49.668, *df*=4, *P*=0.000).

Available time had less effect on e-book than print book use. Of those who agreed or completely agreed that they had time to go to the library, 64.7% (n=132/204) had used an HSLS e-book in the past year, while 55.3% (n=126/228) who disagreed or completely disagreed had used an e-book ($\chi^2$=5.750, *df*=4, *P*=0.219). Distance to the library and e-book use were inversely proportional. Sixty-seven percent (n=198/296) who were located within 1 block of the library had used an HSLS e-book, while 52.3% (n=137/262) who were 2 or more blocks away had used 1 ($\chi^2$=12.478, *df*=3, *P*=0.005).

**Importance of e-book features to users.** Respondents valued printing, saving, and searching e-books more than bookmarking, highlighting, and annotating content (Figure 3). Printing was rated moderately to extremely important by 76.6% (n=661/863), while saving to a computer was given the same rating by 72.0% (n=621/863). Full-text searching was moderately to extremely important to 73.9% (n=638/863). Respondents were less interested in bookmarking, highlighting, and annotating text.

**Type of book and format preference.** There were differences in format preference by type of book, as

**Figure 3**
Importance of e-book features (n=863)*




* Includes respondents who never used an Health Sciences Library System (HSLS) e-book. Results did not change when restricted to only e-book.

summarized in Figure 4. E-books were preferred most often for general reference and pharmaceutical reference, while print books were preferred most often for textbooks and handbooks. For all book types, some respondents were inflexible in their preference, but for each type, a large proportion (62.4%–78.7%) said they would use the format that was most convenient at time of use. Those preferring print were more flexible about using e-books than those preferring e-books were about using print.

## Intended use and e-book or print preference

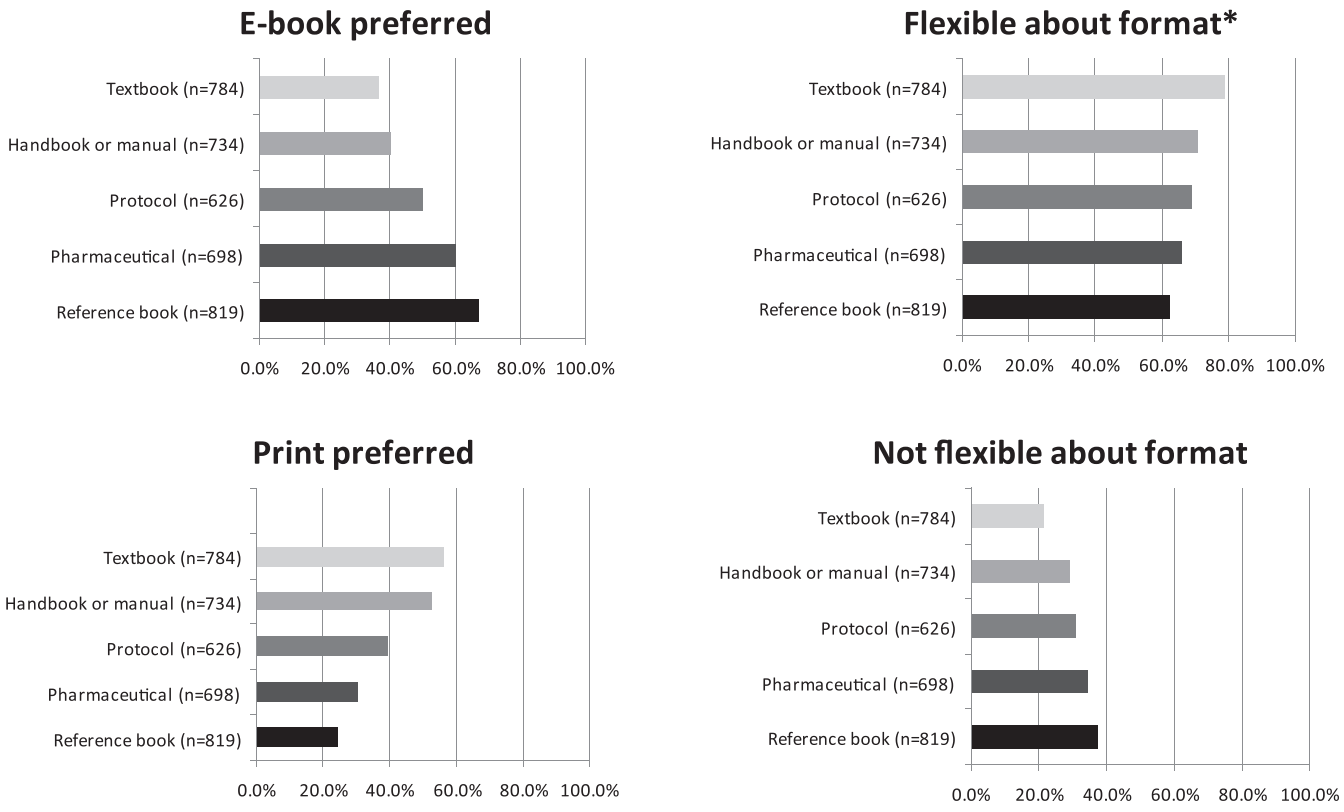
**E-book use for clinical care, teaching, learning, and research.** The survey indicates that UPMC respondents are using e-books. Their intended use varied by job category. E-books were used for clinical care by 75.3% (n=55/73) of attending physicians; 86.0% (n=86/100) of interns, residents, and fellows; and 38.9% (n=28/72) of nurses. They were used by 61.8% (n=21/34) of other clinical care specialists, such as respiratory care and physical therapists. Almost half of UPMC administrators (n=14/30, 46.7%) reported using e-books to support administrative tasks.

At the university, 76.5% (n=62/81) of postdoctoral students and fellows, and 54.1% (n=124/229) of faculty reported using e-books to support research. E-books were less frequently assigned for class readings. Only 21.3% (n=37/174) of people with teaching responsibilities reported assigning a class reading from an e-book. Fewer undergraduate students (n=7/50, 14.0%) than graduate and medical students (n=77/230, 33.5%) reported being assigned a class reading from an e-book, while 51.0% (n=25/49) of undergraduates and 62.1% (n=139/224) of graduate and medical students used an e-book to complete an assignment.

## Limitations of the study

The study had a large enough sample to detect differences in e-book use by various academic health sciences library user groups, and the mix of survey respondents reflected the mix of roles and institutional affiliations at the university and hospitals. However, the response rate to the survey was lower than expected, despite the use of several methods to increase response rates, including a cover email from the library director endorsing the survey and stating its importance to library users and several follow-up reminder emails to nonresponders. This suggests that nonresponse bias could apply. The sampling frame, library users with remote access passwords, might also have biased the results, possibly overestimating the proportion of all library patrons who used e-books. Other possible limitations to the study included the absence of complete data from participants who did not finish the survey (n=108/979, 11.0%) and potential confusion over the definition of e-books. While a working definition was given at the beginning of the survey, information in the comments to

**Figure 4**
Book format preferences and flexibility*




* Respondents that indicated they would use their least preferred format if it was more convenient at the time of use or indicated no preference are coded as flexible.

the survey indicated that several participants were unsure of what an e-book was. Finally, the results might not be generalizable to other libraries with different user populations and collections.

## DISCUSSION

Information need drives both e-book and print use, with contextual factors such as distance from the library less important determinants of use. The volume of e-book use by library patrons varied according to their different roles, reflecting the information-intensive qualities of those roles, with students, postdoctoral fellows, researchers, and clinical physicians among the heaviest e-book users. A high volume of e-book use was also associated with a high volume of print book use. Some of the heaviest users of the e-book collection were within one block of a library, disproving the intuitive idea that e-book use would increase with distance from the library.

Preference for e-books or print varied with the type of book. Study respondents' preferences indicated that reference books or pharmaceutical references were the best candidates for e-books. Most surprisingly, a large percentage of users (62.4%–78.7%) claimed they were flexible with respect to print or electronic format, stating that they would use their least preferred format if it were the most convenient to access at the time of need. This should give collection development librarians more confidence that purchasing reference books and other essential medical books that are likely to be used like reference books [32, 33, 39] as e-books will satisfy the majority of users' information needs, especially if more e-book vendors offer printing of whole chapters for offline in-depth study. If economics dictate that duplication of books in both formats must be reduced, a combination of promoting the e-book collection to increase awareness and educating users to increase user e-book skills may increase the adoption of e-books by those who prefer print.

Awareness of HSLS e-books (n=599/914, 65.5%) was comparable to that in other studies [30, 33, 35, 38]. The survey itself promoted e-book awareness: 17 respondents said in free-text comments that they were unaware of HSLS e-books before taking the survey. Others called for increased promotion and educational efforts, such as the respondent who said, ''I wish they were better 'advertised' as available resources. I kind of happily stumbled upon them. It would be great if it were more widely known.'' This is good news, as HSLS designed the website so that users could stumble on resources without librarian intervention, but supplementing good web design with active promotion—such as inclusion in library orientations, newsletter articles, and in-person or online

training sessions, as recommended by Dinkelman and Stacy-Bates—could increase use [19]. User education may be key to expanding use of the e-book collection. As one respondent said:

> The librarians at [UPMC] Shadyside have helped me learn how to easily access the HSLS in the past two years. I was surprised that after doing this survey my preference has now changed to wanting to use an electronic source. It is all because I now know how to easily find what I want in the HSLS.

Study findings support claims that users prefer web access to e-books over library catalog access [5, 27, 32, 33, 35, 42]. Prominence on the HSLS home page and enhanced access to e-book content may be responsible for the high approval rating for the HSLS federated e-book search. It was preferred over the library catalog by survey respondents. While some commented that the federated e-book search was slow, they appreciated the enhanced access to the content of the e-book collection that it provides. However, users might not know the federated search did not include all e-books available at the university. The federated search tool represents a step in the right direction, but more inclusive full-text search options across all Pitt e-book collections would increase access to information. Since the survey, the ''A to Z'' e-book title list has been removed from the website. Even though survey respondents rated it highly, HSLS librarians felt that as the e-book collection expanded, this list became too long for useful browsing. No complaints were received following the ''A to Z'' list removal, perhaps because the four remaining e-book search tools are sufficient.

Users indicated that they would be willing to use a less preferred format, if it were more convenient at the time of need. The development of a more sophisticated and prominently placed combined e-book and print search tool should allow users to more easily discover all the available format options. They rated the library catalog lower than other search tools, yet only by searching the catalog can they locate the full range of e-book titles available to them at Pitt. Users rated Google Books, which provides a combination of full-text searching with catalog access for print book location, very highly. If the Google Books interface could be extended to reliably link library patrons to e-books in their library, perhaps this would be the most useful e-book discovery tool.

The HSLS e-book collection is heavily used for clinical, research, and individual study purposes. This result mirrors those of other studies [27, 30]. That attending physicians, medical students, postgraduate medical trainees, and researchers used e-books most heavily was not surprising, given the information-intensive nature of those roles. One physician respondent referred to e-books as a ''lifesaver in my clinical position.'' Some respondents commented that internal medicine and surgery subjects were well represented in the collection, but pediatrics and pathology were not, and that they wished there were more e-books in their specialties. This indicates some user groups may not be using the e-books because the collection does not include what they want. Collection analysis and focus group discussions with representatives of different user groups could help identify strengths and weaknesses in the collection by topic area and specialty.

The HSLS e-book collection was not used heavily by faculty for assigning class readings but was used frequently by students to complete course assignments. E-book chapters cannot be easily posted to course management software, and licensing of sufficient simultaneous e-book users for class access purposes can be problematic. If e-book publishers want their products to support classroom use, they should consider ''journalizing'' them as SpringerLink has done, allowing saving of chapters and posting to course management systems [5]. This would also increase their appeal to users who want to print or save chapters for future use.

## CONCLUSION

Moving forward, librarians should consider several courses of action based on the study results. First, while passive promotion through cataloging and prominent placement on the library website brings e-books to the attention of many library users, more active instruction and promotion is needed to increase use of the collection by library patrons. Second, because patrons prefer Internet access to library catalog access, every effort should be made to ensure that e-book catalog records can be repurposed for web access with minimal technical effort and that, whenever possible, full-text search options are provided to enhance access to book content. Finally, user flexibility about book format indicates collection development librarians can selectively reduce duplication of titles in print and electronic forms.

This study looked at e-book use in relation to many factors—demographic, affiliation, reason for use, and type of book—and found that health sciences users are flexible about what they use and will get the information they need, however they need to get it. Perhaps librarians are spending too much time thinking about information containers (print versus electronic), a library-centric way of thinking, and not about the content. Study respondents were frequent users of information, using it in whatever container it comes in and locating it with a variety of access methods.

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## AUTHORS' AFFILIATIONS

**Barbara L. Folb, MM, MLS, MPH*** (corresponding author), folb@pitt.edu, NLM Informationist Fellow, Graduate School of Public Health, Department of Behavioral and Community Health Sciences, University of Pittsburgh, A716 Crabtree Hall, 130 DeSoto Street, Pittsburgh, PA, 15261; **Charles B. Wessel, MLS,** cbw@pitt.edu, Head of Hospital Services; **Leslie J. Czechowski, MA, MLS,** lczech@pitt.edu, Assistant Director of Collections and Technical Services; Health Sciences Library System, University of Pittsburgh, 200 Scaife Hall, 3550 Terrace Street, Pittsburgh, PA 15261

*Received September 2010; accepted January 2011*

* Current affiliation and address: Barbara L. Folb, folb@pitt.edu, Public Health Informationist, Health Sciences Library System, University of Pittsburgh, 200 Scaife Hall, 3550 Terrace Street, Pittsburgh, PA 15261.